droplet **51** to be expelled. The projection **13** may have any suitable shape, which may depend upon the function that it performs in the sample transfer device **1**. Similarly, the sample transfer device **1** may have multiple layers of different material, e.g., as in **FIG. 2** or **3**, or have any other suitable configuration.

[**0033**] **FIG. 5** shows another illustrative embodiment of a sample transfer device **1** having at least one cavity **14**. One or more cavities **14** in the sample transfer device **1** may aid in the formation of droplets expelled from the sample transfer device **1**. For example, a cavity **14** may serve to focus or otherwise direct pressure waves in a liquid sample material **5** when one or more portions of the sample transfer device **1** moves, e.g., in a way like that shown in **FIG. 3**. The focusing or other effect on pressure waves may help form a droplet **51** when depositing a sample. Alternately, a cavity **14** may serve to preferentially heat one portion of the sample transfer device **1** or the sample material **5**. For example, the cavity **14** may increase the surface area of the sample transfer device **1** in contact with the sample material **5**, thereby increasing the heat transfer and consequent formation of a droplet **51** to be expelled. The cavity **14** may have any suitable size and/or shape depending on the function it performs. Moreover, the sample transfer device **1** may have two or more cavities **14** that may be individually addressed by the illumination source **2** or may otherwise individually form droplets **51** that are expelled from the sample transfer device **1**. Like the projections **13** in **FIG. 4**, one or more cavities **14** may be incorporated in any type of sample transfer device, including those having two or more layers. Moreover, projections **13** and cavities **14** may be combined into single device and work together to deposit sample material **5**.

[**0034**] **FIG. 6** shows another illustrative embodiment of a sample transfer device **1** having an internal chamber **16** and an opening **15**. In this illustrative embodiment, a sample material **5** is located in the chamber **16**. The sample material **5** may or may not entirely fill the chamber **16**. Upon illumination of the sample transfer device I, at least a portion of the sample material **5** may be expelled through the opening **15** and deposited on a work surface **4**. The cause of the sample material **5** being forced through the opening **15** may be any of those described above, namely a heating of the sample material **5** or gas or other material in the chamber **16**, movement of one or more portions of the sample transfer device I, or a transfer of kinetic or other energy from the illumination beam to portions of the sample material **5**. For example, **FIG. 7** shows one illustrative embodiment in which an upper portion of the sample transfer device **1** includes first and second layers **11** and **12** like that in the **FIG. 2** embodiment. As can be seen in **FIG. 8**, illumination of the sample transfer device **1** may cause the first and second layers **11** and **12** to move from a rest position to a deflected position, e.g., a concave up condition shown in **FIG. 8**, which forces sample material in the chamber **16** through the opening **15**. As with other illustrative embodiments, the sample transfer device may include multiple chambers **16** with multiple openings **15** from which droplets **51** may be expelled. Alternately, the sample transfer device **1** may be provided with one relatively large chamber **16** that communicates with two or more openings **15** through which droplets are expelled.

[**0035**] In another illustrative embodiment shown in **FIG. 9**, a mask **16** may be provided with a pattern of openings **15** and the sample transfer device **1** may expel sample material **5** in the general direction of the mask. The mask **16** may then selectively block portions of the sample material expelled by the sample transfer device **1**, only allowing sample material to be deposited through the openings **15** in the mask **16** and onto desired locations on the work surface **4**. The mask **16** may be secured to the sample transfer device **1**, or may be separate.

[**0036**] In another illustrative embodiment shown in **FIG. 10**, the sample transfer device **1** may have an explosive or other reactive substance or substances **17** on a portion of the sample transfer device **1**. This substance **17** may explode or expand rapidly upon illumination of the illumination beam, thereby transferring kinetic energy to the sample transfer device **1**. The explosion or rapid expansion may cause a portion of the sample transfer device **1** to move and cause a deposition of the sample material **5**. The substance **17** may be provided in discrete locations on the sample transfer device **1** and selectively illuminated, the substance may be provided in a continuous layer and selectively illuminated, or other.

[**0037**] Various aspects of the invention may be particularly useful in depositing liquid samples of genomic, proteomic or other materials used in biotech research. Extremely small volume droplets may be produced using various aspects of the invention, with droplet volumes ranging down to the nanoliter size range. Aspects of the invention also allow sample deposition to occur with few moving parts and limited contact between the sample and the deposition apparatus.

[**0038**] While the invention has been described with reference to various illustrative embodiments, the invention is not limited to the embodiments described. It is evident that many alternatives, modifications and variations of the embodiments described will be apparent to those skilled in the art. Accordingly, embodiments of the invention as set forth herein are intended to be illustrative, not limiting. Various changes may be made without departing from the invention.

1. A sample depositing system comprising:

an illumination source that forms an illumination beam;

a sample transfer device that receives the illumination beam from the illumination source;

a sample material carried by the sample transfer device; and

a controller that causes the illumination source to illuminate the sample transfer device and thereby cause at least a portion of the sample material carried by the sample transfer device to be controllably separated from the transfer device and deposited on a work surface, the portion of sample material being deposited without requiring a portion of the sample transfer device positioned adjacent the sample material to separate from the sample transfer device.

2. The system of claim 1, wherein the sample transfer device includes:

at least one layer of a material that is translucent or transparent to the illumination beam; and